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EXAMINER	
ORTIZ, EDGARDO	
ART UNIT	**PAPER NUMBER**
2815	

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/927,320	Darwish Et.al.
Examiner	**Art Unit**
Edgardo Ortiz	2815

-- ***The MAILING DATE of this communication appears on the cover sheet with the correspondence address*** --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *May 19, 2003* .

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *2-8, 10-14, 16, 18, 30, and 31* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *2-8, 10-14, 16, 18, 30, and 31* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

This Office Action is in response to a request for continued prosecution filed May 19, 2003 on which Applicant amended claims 2, 4-8, 10-14, 16, 18, 30 and 31 and canceled claims 1, 9, 15, 17.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 2-8, 10-14, 16, 18, 30 and 31 are rejected under 35 U.S.C.§ 102 (e) as being anticipated by Hshieh (U.S. Patent No. 6,262,543). With regard to Claim 2, Hshieh teaches a gate (125) adjacent to a first insulative layer (120) and a second insulative layer (120') within said trench.

With regard to Claim 3, Hshieh teaches a gate (125) that comprises polysilicon.

With regard to Claim 4, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), defining a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type (n) adjacent to a sidewall of said trench and to said surface, a body region (130) of a second conductivity type (p) opposite to said first conductivity type, adjacent to said source region and to said sidewall, a drain region comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom portion of said trench, said second insulative layer being in contact with said first insulative layer and said second insulative layer being thicker than said first insulative layer.

The limitation "second *deposited* insulative layer" is a product by process limitation. A "product by process" claim is directed to the product per se, no matter how actually made, In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Marosi et al, 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by

process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Furthermore, the generic term "*deposited*", used to describe the second insulative layer, is met by the reference.

Additionally, the limitation "*whereby formation of said second insulative layer does not introduce substantial stress in said substrate*" is an intended use limitation which does not structurally distinguish the claimed invention from that taught by the teachings of Hshieh.

With regard to Claim 5, Hshieh teaches a first insulative layer (120) comprising an oxide.

With regard to Claim 6, Hshieh teaches a second insulative layer (120') comprising an oxide.

With regard to Claim 7, Hshieh teaches a second insulative layer (120') is a multi-layer insulative layer, comprising dry oxidation grown oxide layers.

With regard to Claim 8, Hshieh teaches an MIS device that is a MOSFET.

With regard to Claim 10, Hshieh teaches a gate (125) that comprises polysilicon.

With regard to Claim 11, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), defining a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type (n) adjacent to a sidewall of said trench and to said surface, a body region (130) of a second conductivity type (p) opposite to said first conductivity type, adjacent to said source region and to said sidewall, a drain region comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom portion of said trench, said second insulative layer being in contact with said first insulative layer and said second insulative layer being thicker than said first insulative layer, a gate (125) adjacent to said first insulative layer (120) and said second insulative layer (120') within said trench and a high conductivity region (118) of said first conductivity in a drain region (110) adjacent to at least said bottom portion of a trench.

The limitation "second *deposited* insulative layer" is a product by process limitation. A "product by process" claim is directed to the product per se, no matter how actually made, In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Marosi et al, 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product

by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Furthermore, the generic term "*deposited*", used to describe the second insulative layer, is met by the reference.

Additionally, the limitation "*whereby formation of said second insulative layer does not introduce substantial stress in said substrate*" is an intended use limitation which does not structurally distinguish the claimed invention from that taught by the teachings of Hshieh.

With regard to Claim 12, Hshieh teaches a first insulative layer (120) comprising an oxide.

With regard to Claim 13, Hshieh teaches a second insulative layer (120') comprising an oxide.

With regard to Claim 14, Hshieh teaches a second insulative layer (120') comprising a multi-layer insulative layer, comprising dry oxidation grown oxide layers.

With regard to Claim 16, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), defining a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type (n) adjacent to a sidewall of said

trench and to said surface, a body region (130) of a second conductivity type (p) opposite to said first conductivity type, adjacent to said source region and to said sidewall, a drain region comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom portion of said trench, said second insulative layer being in contact with said first insulative layer and said second insulative layer being thicker than said first insulative layer, wherein a thickness of a transition insulative layer at the juncture of said first insulative layer and said second insulative layer is not less than a thickness of said first insulative layer, a gate (125) adjacent to said first insulative layer (120) and said second insulative layer (120') within said trench and a high conductivity region (118) of said first conductivity in a drain region (110) adjacent to at least said bottom portion of the trench.

The limitation "second *deposited* insulative layer" is a product by process limitation. A "product by process" claim is directed to the product per se, no matter how actually made, In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Marosi et al, 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product

produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Furthermore, the generic term "*deposited*", used to describe the second insulative layer, is met by the reference.

Additionally, the limitation "*whereby formation of said second insulative layer does not introduce substantial stress in said substrate*" is an intended use limitation which does not structurally distinguish the claimed invention from that taught by the teachings of Hshieh.

With regard to Claim 18, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), defining a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type (n) adjacent to a sidewall of said trench and to said surface, a body region (130) of a second conductivity type (p) opposite to said first conductivity type, adjacent to said source region and to said sidewall, a drain region comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom portion of said trench, said second insulative layer being in contact with said first insulative layer and said second insulative layer being thicker than said first insulative layer, wherein a width of said trench at a vertical midpoint of said second

insulative layer is not greater than a width of said trench adjacent to said body region, a gate (125) adjacent to said first insulative layer (120) and said second insulative layer (120') within said trench and a high conductivity region (118) of said first conductivity in a drain region (110) adjacent to at least said bottom portion of the trench.

The limitation "second *deposited* insulative layer" is a product by process limitation. A "product by process" claim is directed to the product per se, no matter how actually made, In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Marosi et al, 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Furthermore, the generic term "*deposited*", used to describe the second insulative layer, is met by the reference.

Additionally, the limitation "*whereby formation of said second insulative layer does not introduce substantial stress in said substrate*" is an intended use limitation which does not structurally distinguish the claimed invention from that taught by the teachings of Hshieh.

With regard to Claims 30 and 31, the limitation "*the first insulative is thermally grown*" is a product by process claim which does not structurally distinguish the claimed from that taught by Hshieh. A "product by process" claim is directed to the product per se, no matter how actually made, In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Marosi et al, 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Furthermore, Hshieh teaches a first insulative layer (120) that is thermally grown (column 3, lines 38-41 and column 6, lines 7-10).

Response to Arguments

2. Applicant's arguments filed May 19, 2003 have been fully considered but they are not persuasive for the reasons stated in the body of the office action. Applicant argues that "*Hshieh in particular does not teach, disclose, or suggest a MIS device comprising a high conductivity region of a first conductivity type in the drain region adjacent to at least the bottom portion of the trench, as claimed*". However, the examiner disagrees and notes that as stated in the rejection and shown by the reference on figure 4, Hshieh teaches a high conductivity region (118) of a first

conductivity type (n) in a drain region (110) *adjacent* to at least a bottom portion of a trench. Therefore, the claimed invention does not structurally or patentably distinguish from that taught by the prior art.

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Edgardo Ortiz (Art Unit 2815), whose telephone number is (703) 308-6183 or by fax at (703) 308-7722. In case the Examiner can not be reached, you might call Supervisor Eddie Lee at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 receptionist whose telephone number is (703) 308-0956.

EO/AU 2815

5/30/03

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